



Three City Urban Soil Lead Abatement Demonstration Project

Office of Emergency and Remedial Response
Hazardous Site Evaluation Division 5204G

Quick Reference Fact Sheet

BACKGROUND

The U.S. Environmental Protection Agency's Superfund program conducted a pilot removal of lead-contaminated soil in urban residential areas. The \$15 million project, mandated by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and initiated in 1987, was designed to evaluate what effect lead-contaminated soil removal in urban areas had on the level of lead in children's blood. Scientists determined this effect by measuring children's blood-lead levels before and after the removal of lead-contaminated soil. This study was coordinated with the Agency-wide Lead Cluster and is part of EPA's strategy for reducing lead exposures.

The project, also known as the "Three City Lead Study," was conducted in the cities of Boston, Baltimore, and Cincinnati. Three organizations, the City of Boston, the Maryland Department of the Environment, and the University of Cincinnati, were responsible for the day-to-day activities. EPA provided management and technical oversight.

The basic project in each city consisted of three phases: pre-abatement sampling, soil abatement, and post-abatement sampling. The pre-abatement phase established the baseline conditions for lead levels in water, soil, blood, etc. The abatement phase was the actual removal of soil and dust under carefully controlled conditions. The post-abatement phase was a period of monitoring designed to determine the impact of abatement on exposure reduction. All three cities successfully completed these phases. Complete project descriptions, including project designs, sampling and analysis protocols, abatement methods, baseline data, and logistical hurdles can be found in the study's "Midterm Project Update" (May, 1991), available through the Superfund Document Center.

SYMPOSIUM

The Symposium on Urban Soil Lead Abatement was held August 5-6, 1992, in Research Triangle Park, North Carolina. The preliminary findings (listed below) from the individual city projects were presented at this meeting.

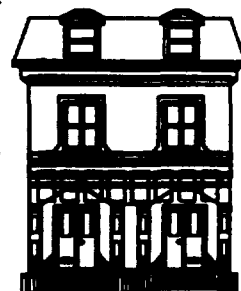
Boston

- Preliminary analysis found evidence of a small, measurable, statistically significant reduction in children's blood lead levels observed approximately one year following soil and

interior house dust abatement. Surface soil lead levels were reduced an average of 1856 parts per million (ppm) and replaced with non-contaminated soil. As a result, the study participants' mean blood lead levels declined 0.8-1.6 micrograms per deciliter ($\mu\text{g/dL}$).

Baltimore

- Preliminary evaluation found no evidence to prove that soil abatement reduced blood lead levels in children. (No dust
(continued))



NOTE: These findings are based on draft reports. Data are currently being reanalyzed by EPA and are subject to change.

Baltimore (continued)

abatement was conducted and all of the study homes contained both interior and exterior lead-based paint.)

Cincinnati

- Preliminary analysis revealed no evidence that soil and exterior dust abatement reduced blood or hand lead levels. Recontamination of exterior paved areas occurred within weeks of abatement. Recontamination of interior areas with dust lead occurred more slowly with around 50% recontamination after one year.

REPORTS

Specific study findings will be contained in individual city reports. Individual city reports are not expected to be available for public release before September 30, 1992. To obtain a copy of each report, please write to the address listed under Additional Information. In addition, EPA will prepare an integrated technical report that will include information from the analyses of the combined three city data set. The integrated report is scheduled to be available in January 1993.

EPA HEADQUARTERS CONTACT

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ADDITIONAL INFORMATION

- Copies of the Midterm Project Update are available from the Superfund Document Center at (202) 260-9760.
- Updated copies of study protocols (prepared in October 1991) are available from:

Dr. Robert Elias
U.S. EPA
Environmental Criteria and Assessment Office
MD-52
Research Triangle Park, NC 27711
Phone: (919) 541-4167

- Copies of the Boston final report (available after September 30, 1992) may be obtained from:

U.S. EPA - Region I
Environmental Services Division
60 Westview Street
Lexington, MA 02173

- Copies of the Baltimore final report (available after September 30, 1992) may be obtained from:

U.S. EPA - Region III
Community Relations Coordinator
841 Chestnut Street
Philadelphia, PA 19107

- Copies of the Cincinnati final report (available after October 1992) may be obtained from:

U.S. EPA - Region V
Office of Public Affairs
77 West Jackson Blvd.
Chicago, IL 60604

STAY TUNED FOR...

- The President's Commission on Environmental Quality (PCEQ) campaign will begin this Fall. The public outreach efforts, done in cooperation with Time Warner, Inc., will include radio, print and television announcements soon after the presidential election. The campaign is targeted primarily towards parents of young children and is intended to heighten public awareness regarding lead poisoning. These efforts will identify sources of lead poisoning, harmful effects, and effective ways to reduce exposure.
- The Lead Public Education brochure, published by EPA will be available by the end of October, 1992. The brochure, describing general information on lead and how to reduce lead exposures, will be available through the National Lead Information Center.
- The National Lead Information Center will be in operation this Fall. Initially callers to the National Lead Information Center can leave their name and address to receive a copy of the brochure and a contact for lead information in their state.

URBAN SOIL LEAD ABATEMENT DEMONSTRATION PROJECT STUDY COMPARISON MATRIX

Activity	Boston	Baltimore	Cincinnati
Population	152 total Age: 9 mos. to 4 yrs. 54-Study 51-Ctrl. A 47-Ctrl. B (3 dropped; 22 moved but are tracked)	408 total Age: 6 mos. to 6 yrs. 211-Study 197-Ctrl. (221 dropped)	291 total Age: 6 mos. to < 6 yrs. 56-Study A 136-Study B 99-Ctrl. C (135 moved; 3 dropped)
# of Groups	1 Study 2 Control	1 Study 1 Control	2 Study 1 Control (Study B served as Ctrl. Grp for Study A)
Housing Type	Mainly multi-family single unit Some single family	Single family	Multi-family absentee owner *Mainly rehabilitated
Pre-Abatement	Sample: soil, dust (interior), blood & handwipes (paint and water sampled 18 mos. later)	Sample: soil, dust (interior), blood, exterior paint, water, & handwipes	Sample: soil, dust (interior & exterior), blood & handwipes (paint and water sampled 18 mos. later)
Pre-Abatement Blood Lead Concentrations	7 µg/dL—24 µg/dL (truncated) X = 12.6 µg/dL % PbB ≥ 10 µg/dL: 71%	0 µg/dL—30+ µg/dL X = 12.5 µg/dL % PbB ≥ 10 µg/dL: 59%	0 µg/dL—30+ µg/dL X = 11.7 µg/dL % PbB ≥ 10 µg/dL: 52%
Pre-Abatement Soil Lead Level (Arithmetic Mean)	0-2 cm: 2,620 ppm 13-15 cm: 1,882 ppm	0-2 cm: 571 ppm 13-15 cm: 365 ppm	0-2 cm: 505 ppm 13-15 cm: 371 ppm
Hypothesis	Primary hypothesis	Primary hypothesis 2nd: Reduced soil lead reduces interior dust lead	Primary hypothesis 2nd: Reduced interior/exterior dust lead reduces blood lead levels
Intervention	Soil and interior dust abatement Interior loose paint stabilization	Soil abatement Exterior paint stabilization	Soil, interior, and exterior dust abatement
Abatement Levels	Soil abated from entire yard Replaced with ≤ 150 ppm soil (Top 6" of soil was removed)	Soil abated at > 500 ppm from yards Replaced with ≤ 50 ppm soil (Top 6" of soil was removed)	Neighborhood level abatement Replaced with ≤ 50 ppm (Top 6" of soil was removed) Soil abated at >500 ppm from yards and public playgrounds

URBAN SOIL LEAD ABATEMENT DEMONSTRATION PROJECT STUDY COMPARISON MATRIX

Activity	Boston	Baltimore	Cincinnati									
Pre-/Post-Abatement Blood Lead Levels $\mu\text{g/dL}$	(Arithmetic mean)	(Geometric mean)	(Geometric Mean)									
	<u>Std. Grp</u>	<u>Ctrl. A</u>	<u>Ctrl. B</u>	<u>Dates</u>	<u>Std. Grp.</u>	<u>Ctrl. Grp.</u>	<u>Dates</u>	<u>Std. Grp. A*</u>	<u>Std. Grp. B*</u>	<u>Ctrl. C*</u>	<u>Dates</u>	
	Pre-1	13.2	12.4	12.0	9/89-1/90	10.9	10.9	8/88-12/88	8.9	10.6	8.0	6/89-7/89
	Pre-2	N/A	N/A	N/A	N/A	10.0	10.5	2/89-8/89	N/A	N/A	N/A	N/A
	Pre-3	N/A	N/A	N/A	N/A	9.7	9.0	1/90-8/90	N/A	N/A	N/A	N/A
	Post-1	10.3	8.9	9.8	3/90-6/90	8.6	7.8	1/91-3/91	7.0	9.2	5.7	11/89-12/89
	Post-2	11.7	11.5	11.4	7/90-11/90	9.6	8.0	5/91-7/91	8.9	8.7	7.6	6/90-7/90
	Post-3	N/A	N/A	N/A	N/A	9.7	8.4	8/91-9/91	8.2	7.5	7.7	11/90-12/90
	Post-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.8	9.1	8.8	6/91-7/91
		Post 1 at 6 mos. after abatement Post 2 at 11 mos. after abatement	Post 1 at 3 mos. after abatement Post 2 at 6 mos. after abatement Post 3 at 11 mos. after abatement	Post 1 at 3 mos. after abatement Post 2 at 9 mos. after abatement Post 3 at 3 mos. after abatement #2 (15 mos.) Post 4 at 9 mos. after abatement #2 (21 mos.) * Cincinnati had a second abatement in Area B from 8/90 to 9/90								
Relative Cost Comparison by Geographic Area	Cost per Property—Soil Abatement	Cost per Property—Soil Abatement	Cost per Subject—Soil Abatement									
	1989: \$9,598 1990: \$6,634 Included in the cost per property are: soil sampling and analysis; contract development/supervision; abatement contracts; soil disposal; and, miscellaneous extra costs such as yard cleaning, hoses, and cold weather abatement.	\$4,896 (63 properties) Included in the cost per property are: soil sampling and analysis; contract development/supervision; abatement contracts; soil disposal; and, miscellaneous extra costs such as yard cleaning and watering.	\$2,444** Cost per Meter squared—Soil Abatement \$30** **These costs do not include the developmental costs and associated health and safety monitoring.									

URBAN SOIL LEAD ABATEMENT DEMONSTRATION PROJECT STUDY COMPARISON MATRIX

Activity	Boston	Baltimore	Cincinnati
<i>Findings</i>	Found evidence that a reduction of an average of 1,856 ppm of Pb in soil to <150 resulted in a 0.8—1.6 µg/dL decline in mean PbB levels of urban children.	Found no evidence to prove that soil abatement reduces blood lead level.	The preliminary analysis revealed no evidence that soil and exterior dust abatement reduced blood or hand lead levels. Recontamination of exterior paved areas with dust lead occurred within weeks of abatement. Recontamination of interior areas with dust lead occurred more slowly with around 50% recontamination after one year.